

The effects of age and cue-action reminders on event-based prospective memory performance in preschoolers

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Abstract

The present study investigated event-based prospective memory in five age groups of preschoolers (i.e., 2-, 3-, 4-, 5-, and 6-year-olds). Applying a laboratory-controlled prospective memory procedure, the data showed that event-based prospective memory performance improves across the preschool years, at least between 3 and 6 years of age. However, our findings do not confirm early speculations that 2-year-olds may have attained reliable skills to carry out future intentions on their own. By contrast, there were first signs of prospective memory abilities among the 3-year-olds. The present study also revealed that children as young as 3 years can use external memory aids in the form of cue-action reminders to improve their event-based prospective remembering. Finally, the findings suggest that parents or caregivers can adequately estimate their preschool children's prospective memory abilities, as revealed by applying a modified version of the Prospective and Retrospective Memory Questionnaire (PRMQ).

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The ability to remember to perform intended activities, i.e., *prospective memory*, has received an increasing interest within the literature investigating real-life aspects of memory functioning (Brandimonte, Einstein, & McDaniel, 1996; Kliegel, McDaniel, & Einstein, in press). Already in early childhood, the need to remember to carry out intended activities on one's own initiative is highly prevalent (Winograd, 1988), such as in situations where a young girl is required to hand a message to her grandfather or to pack the favorite toy before leaving on holidays. Two types of prospective memory tasks have been investigated (Einstein & McDaniel, 1990): The occasion to

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perform the intended action is either indicated by an event in *event-based* tasks; or by the passage of a particular amount of time or a specific point in time in *time-based* tasks. The focus of the current project is on event-based prospective memory, which is typically studied in the laboratory by embedding prospective memory cues in an ongoing activity, which must be interrupted so the intended action can be performed.

Within the developmental domain, our knowledge on prospective memory skills in childhood and adolescence is still in an “embryonic stage” (see Kvavilashvili, Kyle, & Messer, *in press*, for a review). The few available studies have provided important albeit not entirely consistent insights into children’s ability to remember to perform intended actions. Most importantly, existing studies indicate an improvement of event-based prospective memory performance across the 2–13 years age range. However, our current knowledge of the development of prospective memory abilities is restricted by at least the following three unresolved issues.

The *first* issue relates to the two questions (i) about whether or not prospective memory skills *develop across the preschool years* and (ii) about the *earliest age* at which prospective memory skills can be observed (Kvavilashvili et al., *in press*). There is currently only one published study that investigated children as young as 2 years (Somerville, Wellman, & Cultice, 1983). Moreover, only three further studies have recruited preschool children aged 3 years or older (Guajardo & Best, 2000; Kvavilashvili Messer, & Ebdon, 2001; Wang, Kliegel, Liu, & Yang, *in press*), whereas all other published studies concentrated on prospective memory primarily in school age children (Kvavilashvili et al., *in press*).

Somerville et al. (1983) instructed mothers to ask their 2-, 3-, or 4-year-old children to remind them of something that had to be done in the future. These tasks were carried out in everyday life and were either of high or of low interest for the children. Surprisingly, results revealed no general age differences in task performance. Particularly in the high-interest tasks, even the 2-year-olds were similarly successful as the older children, whereas performance was substantially worse in the low-interest tasks. However, it remains to be further tested whether there actually are no age differences in prospective memory performance between 2-, 3-, and 4-year-olds because the Somerville et al. study provided little experimental control and probably was restricted in statistical power to detect age differences due to a relatively small number of participants (Kvavilashvili et al., *in press*).

Guajardo and Best (2000) applied event-based prospective memory tasks to 3- and 5-year-olds. Results revealed that the 5-year-olds outperformed the 3-year-olds in these tasks. However, asking the children about the content of the task instructions at the end of the experiment revealed that the retrospective component (i.e., the memory for task instructions and intention content) was substantially disrupted among the 3-year-olds relative to the 5-year-olds. Hence, the possibility remains that the poor prospective memory performance of the 3-year-olds was largely due to these retrospective memory deficits. Therefore, a more conservative investigation of age differences in prospective memory performance among preschoolers would be to exclude children who do not evidence intact retrospective memory for the prospective memory task instructions, which was done in the present study.

Kvavilashvili et al. (2001) examined event-based prospective memory in 4-, 5-, and 7-year-olds. A small but significant age effect was found, such that the 7-year-olds outperformed both the 4- and 5-year-olds, but with no difference between the latter two groups. Finally, Wang et al. (*in press*) focused on event-based prospective memory skills in 3-, 4-, and 5-year-olds. In a condition where the ongoing task had to be actively interrupted in order to perform the intended action, the 3-year-olds performed significantly worse than the 4- and 5-year-olds, but there was no difference between the latter two groups.

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